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Asymmetry and global profile effects on the evolution of magnetic islands A. POYE, O. AGULLO, S. BENKADDA, PIIM-IIFS, CNRS-Universite de Provence, France, X. GARBET, EURATOM-CEA DRFC CEA-Cadarache, France, A. SMOLYAKOV, University of Saskatchewan, Saskatoon, Canada — Magnetic islands are important magnetic structures in astrophysics and tokamaks contexts. The magnetic island stability is usually characterized by the tearing index stability parameter Δ' . When Δ' is positive, magnetic reconnection occurs and tearing modes grow. The Δ' parameter is determined from the solution in the outer region and depends on the boundary conditions. As a result, the Δ' parameter does depend, in essential way, on global properties of the current profile. After the Δ' parameter has been determined, however, the linear and (to a significant extent) nonlinear stability of tearing modes is formulated in as a local theory for any given value of Δ'. In this paper we demonstrate that a number of essential properties of nonlinear reconnection, such as saturation of magnetic islands and formation of a Y-point singular layer strongly depends on the global features of the current profile. It is also shown that asymmetry of the external solution generated either by a finite (equilibrium) current gradient or by the asymmetry in boundary conditions affects the linear and nonlinear evolution of magnetic islands. The equation for nonlinear saturation of magnetic island width is derived taking into account asymmetry effects.

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